

NASA COAST and OCEANIA Airborne Missions Support Ecosystem and Water Quality Research in the Coastal Zone

NASA has a continuing requirement to collect high-quality *in situ* data for the vicarious calibration of current and next generation ocean color satellite sensors and to validate the algorithms that use the remotely sensed observations. Recent NASA airborne missions over Monterey Bay, CA, have demonstrated novel above- and in-water measurement capabilities supporting a combined airborne sensor approach (imaging spectrometer, microradiometers, and a sun photometer). The results characterize coastal atmospheric and aquatic properties through an end-to-end assessment of image acquisition, atmospheric correction, algorithm application, plus sea-truth observations from state-of-the-art instrument systems. The primary goal is to demonstrate the following in support of calibration and validation exercises for satellite coastal ocean color products: 1) the utility of a multi-sensor airborne instrument suite to assess the bio-optical properties of coastal California, including water quality; and 2) the importance of contemporaneous atmospheric measurements to improve atmospheric correction in the coastal zone. The imaging spectrometer (Headwall) is optimized in the blue spectral domain to emphasize remote sensing of marine and freshwater ecosystems. The novel airborne instrument, Coastal Airborne In-situ Radiometers (C-AIR) provides measurements of apparent optical properties with high dynamic range and fidelity for deriving exact water leaving radiances at the land-ocean boundary, including radiometrically shallow aquatic ecosystems. Simultaneous measurements supporting empirical atmospheric correction of image data are accomplished using the Ames Airborne Tracking Sunphotometer (AATS-14). Flight operations are presented for the instrument payloads using the CIRPAS Twin Otter flown over Monterey Bay during the seasonal fall algal bloom in 2011 (COAST) and 2013 (OCEANIA) to support bio-optical measurements of phytoplankton for coastal zone research.

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